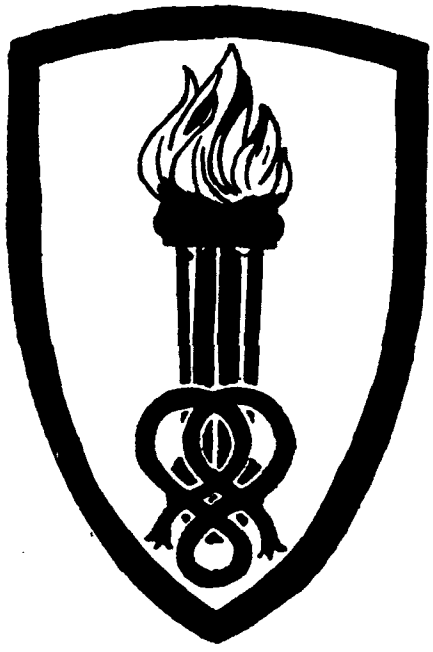
EARLY COMPARABILITY ANALYSIS (ECA)

PROCEDURAL GUIDE



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EARLY COMPARABILITY ANALYSIS

(ECA)

PROCEDURAL GUIDE

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The MANPRINT Methodologies Branch, MANPRINT Programs Division, Manning Integration Directorate, US Army Personnel Integration Command, developed the Early Comparability Analysis methodology. Address questions and comments regarding the methodology or guide to:

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CHAPTER 1

INTRODUCTION

1-1. MPT RESOURCES. Future force integration requirements can impact heavily on Army manpower, personnel, and training (MPT) resources. The demand for more highly sophisticated weapon systems is accompanied by requirements for increased numbers of skilled personnel. This increased requirement for skilled personnel is known as "skill creep" and it is becoming one of the most crucial problems in the materiel acquisition process. In the recruiting base, the number of highly qualified personnel is limited. To further complicate the situation, the Army must compete with the other services and the civilian community for this limited resource. To ensure that the Army's needs for such skilled personnel can be met, MPT factors must be considered early in the materiel acquisition process.

1-2. MPT AND SYSTEM DESIGN. Historically, few MPT factors have been considered in the actual design of new equipment. Experts in materiel acquisition estimate that 70 percent of life cycle system cost decisions are made by the end of the concept phase of the acquisition process. Consequently, early consideration of MPT resources (prior to and during concept exploration) is critical. US Army Personnel Integration Command (USAPIC) developed Early Comparability Analysis (ECA) as a tool to assist combat developers (CD) in the timely and effective introduction of MPT considerations early in the acquisition process. This early input of MPT information can result in equipment design modifications which will lead to a more effective deployment and sustainment of new or improved weapons systems.

1-3. ECA DEFINITION. ECA is a methodology based on an analysis of the operator, maintainer, and repairer tasks associated with predecessor and/or reference systems. ECA helps determine which tasks associated with predecessor/reference systems are MPT resource intensive, and focuses on appropriate MPT solutions to these "high driver" tasks.

1-4. ECA PARTICIPANTS. USAPIC developed ECA as a tool to assist the CD in the introduction of MPT considerations early in the system acquisition process. As the development of the methodology matured, other school participants such as Training Developers (TDs) and Directors of Evaluation and Standardization (DOES) were also included.

1-5. ECA OBJECTIVES. The original tasking, which led to the development of the ECA methodology, specified three interlocking objectives: (1) the establishment of soldier tasks as a common language for systems design; (2) the identification of predecessor system tasks and potential new system tasks costly in MPT resources (high drivers) and; (3) the limitation of high

drivers in contracted design by addressing MPT in planning requirements, and contractual documents.

1-6. ECA INITIATION. ECA is designed for use before, during, and after the drafting of the Operational and Organizational (O&O) Plan. The ECA process should begin as soon as practical after the Concept Based Requirement System (CBRS) has identified a materiel need or upon receipt of a proposed materiel change, while the actual design of the projected materiel is still in flux and can be easily influenced. ECA is also an excellent tool for post-fielding analysis as cited in the MANPRINT Practitioner's Guide.

1-7. ECA DESIGN. Although ECA was originally designed to support major system 'new starts,' it is equally effective when applied to nonmajor new starts, materiel changes, and nondevelopmental item (NDI) acquisitions. ECA can provide data to support materiel alternative decisions. In addition, ECA can be applied throughout the materiel acquisition process. Initially ECA influences design, later it helps ensure supportability. After fielding, ECA can identify problem soldier tasks requiring a materiel change, or for the near-term requiring a manpower, personnel, or training 'quick fix.' ECA can also be applied after fielding as a start point for development of a follow-on system.

1-8. ECA PRIMARY USES. ECA is designed to identify MPT high driver tasks that can be reduced or eliminated in the design of new or improved weapon systems. Additionally, this information can be used in an acquisition audit trail to support system design requirements. ECA also helps develop preliminary MPT constraints and a target audience description (TAD).

1-9. ECA PROCESS. In a twelve step process, ECA condenses task information and simplifies its interpretation, provides an easily understood record of the data analysis and findings, and yields documentation that can be used by the CD to support a justification for design requirements.

1-10. ECA CHARACTERISTICS AND LIMITATIONS. ECA provides a large amount of usable data, but it is not a MANPRINT cure-all. The methodology has the following characteristics/limitations:

a. ECA addresses individual tasks but not collective tasks.

b. ECA does not address supervisory or managerial tasks.

c. ECA addresses MPT issues and to a lesser extent, human factors engineering issues, but not safety or health hazards.

d. ECA provides a basis of comparison for comparable tasks.

e. ECA helps preclude a repeat of old mistakes, but it does not identify new system mistakes.

CHAPTER 2

METHODOLOGY

2-1. DEFINITION/PROCESS. The U.S. Army Personnel Integration Command (USAPIC) developed the ECA methodology as a tool to assist combat developers (CD) in the timely and effective introduction of MPT considerations early in the system acquisition process. The early input of MPT information into the acquisition process can result in equipment design modifications leading to more effective deployment and sustainment of new or improved weapons systems. ECA is a lessons learned approach to the design of a conceptual system. Problems in the predecessor system can be identified as well as potential solutions to fix the problem. ECA is a twelve step process:

Step 1: Initiation

Step 2: Identify relevant MOS

Step 3: Collect task lists

Step 4: Collect data

Step 5: Assign values to data

Step 6: Calculate task scores

Step 7: Identify high drivers

Step 8: Conduct task analysis

Step 9: Conduct learning analysis

Step 10: Identify deficiencies

Step 11: Identify solutions

Step 12: Prepare report

2-2. STEP 1. INITIATION.

a. The first step of the ECA methodology is to determine if an ECA is appropriate. This analysis requires the existence of an Army predecessor or reference system/component.

(1) ECA assumes that most equipment development is evolutionary not revolutionary in nature. Typically, an item of equipment is identified as inadequate to meet current or future needs. New systems or materiel changes have essentially the same type of components and perform the same functions. For example, the Redeye missile is clearly the predecessor of the Stinger

missile, and the M915A1 truck is clearly the predecessor of the M915A2 truck (truck tractor, line haul, 6X4).

(2) In some cases, the conceptual system will have a clearly identified predecessor system but will have an additional component. In such a case, study the predecessor system. If the additional component or a similar component is in the inventory, study it as a reference component. An example is the development of the replacement for the Armored Personnel Carrier (APC). The APC is the predecessor of the Bradley Fighting Vehicle (BFV). Unlike the APC, the BFV has an armored turret. To complete the study, personnel would need to determine if there is a similar component in the Army inventory, and if there is, study the component as a reference component.

(3) If no clearly defined predecessor exists, a similar system in the inventory may be studied as a reference system. For example, there is no predecessor for the Ballistic Missile Defense System Radar, but the Patriot Radar is similar and could be studied as a reference system.

b. ECA is not appropriate when--

(1) A vast technological gap exists between a predecessor/reference system or component and the conceptual system or component.

(2) A clearly defined predecessor system is not in the Army inventory.

(3) Similarities between the predecessor or reference system and the conceptual system are too minimal to justify expenditure of resources.

(4) Tasks for the conceptual item will not be performed by soldiers.

(5) Previous studies have served the purpose of ECA.

(6) Predecessor or reference tasks are insignificant from a MPT perspective.

c. If an ECA is appropriate, resources should be allocated to conduct it. A model to estimate ECA resource requirements is located in Chapter 3. Proponents should consider the following resourcing possibilities--

(1) Allocate internal resources.

(2) Use personnel awaiting school or personnel who are awaiting further assignment following completion of a school.

(3) Incorporate ECA studies into school staff

study projects.

(4) Use temporary limited hires.

(5) Obtain assistance from integrating centers.

(6) Obtain assistance from other TRADOC agencies (e.g., TRADOC Analysis Command).

(7) Request TRADOC funding by submitting the ECA for consideration under the AR 5-5 Study Program.

(8) Request funding assistance from Army Materiel Command (AMC) or project managers (PM).

(9) Prepare justification for permanent positions (long-range).

d. The ECA methodology is an excellent MANPRINT tool. It may be required in the Mission Area Analysis (MAA) process. The ECA methodology is also available to proponents as an optional MANPRINT tool for systems already identified as inadequate to meet the Army's needs. The need for an ECA should be determined during development of the System MANPRINT Management Plan (SMMP).

e. Usually, an ECA requires the participation of other service schools in addition to the proponent for the conceptual system. This is because other service schools may be proponent for some of the operator, maintainer, or repairer MOS identified for analysis. The proponent service school has the final responsibility to determine if an ECA is appropriate and to identify the components or systems to be studied. The proponent should coordinate with and solicit comments and recommendations from all affected service schools. Similar coordination should be conducted between the various directorates within the proponent service school. This coordination will be easier if all interested parties are members of the MANPRINT Joint Working Group (MJWG). The proponent service school Director of Combat Development (DCD) should have final authority to resolve any conflicts that cannot be resolved by the members of the MJWG.

2-3. MOS IDENTIFICATION. Identify relevant MOS and the proponent for all operators, maintainers, and repairers of the predecessor or reference items selected for study in step 1. If it is not clear which MOS are involved with the system to be studied, contact other service schools involved with the system for information. The Qualitative and Quantitative Personnel Requirements Information (QQPRI), if available and current, is also a good source of information.

Example: System--Ground Surveillance Radars
Proponent--US Army Intelligence Center and School (USAICS)

MOS: 39C Target Acquisition -Signal School
Surveillance Radar Repairer

96R Ground Surveillance Systems -Intelligence
Operator School

2-4. STEP 3. COLLECT TASK LISTS. Collect complete task lists by MOS and major component for the studied equipment. For ECA purposes, a task list is defined as an inventory of all tasks that personnel in an MOS perform to operate, maintain, or repair the system or components being studied. The list includes both critical and noncritical tasks. If a task list exists, extract the tasks relating to the components or systems being studied. If a task list does not exist, one must be generated. Recommended sources to assist in preparing task lists for maintainer and repairer MOS are Logistic Support Analysis Records (LSAR), specifically LSA-02, and applicable technical manuals. Recommended sources for operator task lists are Soldiers Manuals (SM), field manuals (FM), technical manuals (TM), Army Occupational Survey Program (AOSP) questionnaires, and subject matter experts (SMEs). Task list preparation is a critical step. If task lists are inadequate, problem tasks may not be identified and ultimately may be left unresolved.

2-5. STEP 4. COLLECT DATA. Collect data on task criteria as it relates to each specific task. For the purposes of ECA, a task is defined as the simplest level of behavior in a job that describes the performance of a meaningful job function. Tasks are observable actions that are measurable in terms of performance, rateable, relatively short in duration, and independent of eachother. Each task identified in step 3 is rated on each of six criteria. A simple 5-point scale is used to evaluate each criteria. The scale values are interpreted as low (1), moderately low (2), moderately high (3), and high (4). The fifth choice (5) offers the SME a "NO OPINION...DON'T KNOW" response alternative in an attempt to avoid problems resulting from guessing by SMEs. Using the six task criteria, the scale provides a straightforward means of differentiating between problem or nonproblem tasks. The criteria and values used for ECA are--

a. Percent Performing (PP). What proportion of the relevant MOS and skill level performs this task?

1 = 1-25 percent
2 = 26-50 percent
3 = 51-75 percent
4 = 76-100 percent
5 = No opinion/Don't know

b. Task Learning Difficulty (TLD). How difficult is it for the average soldier in the appropriate skill level and of the appropriate MOS to learn this task?

1 = Not difficult
2 = Somewhat difficult
3 = Moderately difficult
4 = Very difficult
5 = No opinion/Don't know

c. Task Performance Difficulty (TPD). How difficult is it for the average soldier of the proper skill level and in the proper MOS to perform this task? Consider both cognitive and physical difficulty.

1 = Not difficult
2 = Somewhat difficult
3 = Moderately difficult
4 = Very difficult
5 = No opinion/Don't know

d. Frequency Rate (FR). On the average, how often is this task performed by the average soldier of the proper skill level and in the proper MOS?

1 = Seldom (annually)
2 = Occasionally (semi-annually/quarterly)
3 = Often (monthly)
4 = Frequently (daily/weekly)
5 = No opinion/Don't know

e. Decay Rate (DR). Given this task, how much proficiency does the average soldier lose from the end of this formal training until he/she first performs the task in the field? (Assume that the task is performed within a reasonable period of time after training and is performed by an average soldier of the proper skill level and in the proper MOS.)

1 = Low
2 = Moderately low
3 = Moderately high
4 = High
5 = No opinion/Don't know

f. Time to Train (TT). How much time is required to train the average soldier of the proper skill level and in the proper MOS to perform this task to standard?

1 = Less than 3 hours
2 = 3 hours or more but less than 6 hours
3 = 6 hours or more but less than 9 hours
4 = 9 hours or more
5 = No opinion/Don't know

g. Many of the major sources of data for the respective task criterion are listed below. The list is not all inclusive. The sources will vary depending on the specific equipment and MOS studied.

(1) Percent Performing (PP)
AOSP
Service School surveys
SME opinion

(2) Task Learning Difficulty (TLD)
AOSP
Service schools (go/no-go data,, critical task selection board results, surveys)
Job and task analyses
SME opinion

(3) Task Performance Difficulty (TPD)
SME opinion
US Army Operational Test and Evaluation Command (OPTEC) data
US Army Research Institute (USARI) for the Behavioral and Social Sciences studies
US Army Human Engineering Laboratory (HEL) studies
AOSP
Training Effectiveness Analysis (TEA)

(4) Frequency Rate (FR)
LSAR
AOSP
Job and task analyses
Service school surveys
Technical manuals
SME opinion
Sample data collection (SDC)

(5) Decay Rate (DR)
SME opinion
Service school surveys
ARI studies

(6) Time To Train (TT)
Program of Instruction (POI)
Lesson plans
Soldier's manuals/Trainer's guides
SME opinion

h. The opinion of SMEs is a major source of data used in the ECA methodology. Usually, SMEs are Army noncommissioned officers (NCOs) who have had extensive 'hands on' experience with the studied equipment, recent unit experience, and experience as a trainer or training developer. Ideally, the 'perfect' SME will have spent time using a predecessor system, studying it, and

looking for ways to improve it or its use. Usually the SME will have a good historical perspective on issues and concerns surrounding a system and what has been tried in addressing these issues and concerns. However, locating such SMEs may be difficult. The practical solution is to accept the limitations of SME availability and try to achieve a balance in background and experience. For example, some NCOs will have an extensive training background; others will have unit experience. Exercise good judgment to ensure that a representative sample of the best available NCO is selected for use as SME. SMEs can be found among the personnel of the school directorates, school instructors, and students attending various courses at the school. With some special coordination, it may be possible to have personnel in Table of Organization and Equipment (TOE) units provide subject matter expertise. SME opinion should be routinely sought on all six MPT task criteria. Try to survey at least 10 SMEs. The statistical significance of the data increases as the number of SMEs surveyed increases.

i. To facilitate the collection of SME opinions--

(1) Prepare readable and understandable task list questionnaires that will be easier for SMEs to complete and make scoring easier for the analyst. Appendix B shows an example of a questionnaire.

(2) Tell the SMEs who you are, what your mission is, and how their input will be used.

(3) Have the SMEs complete the questionnaire independently. Do not allow SMEs to discuss questions and answer as a group. Strong personalities in a group can often overwhelm issues of fact, and influence individual responses. (The SME responses will be averaged during the data reduction process, but this is different from an apparent group consensus.)

(4) Ensure the SMEs respond to questions in terms of the average soldier in the proper grade and in the proper MOS. They should not answer in terms of just their own personal experience.

(5) Assure SMEs that their input will be used only for ECA purposes and they will not be associated individually with their responses.

(6) Divide the questionnaire into sections and assign SMEs to specific sections if the questionnaire is lengthy and a sufficient number of SMEs are available.

j. Percent Performing (PP) will not be used as a criterion on unfielded equipment or equipment with limited fielding since reliable data may not be available. If AOSP data is available for percent performing on a task, no other data is required for that criterion.

2-6. STEP 5. ASSIGN VALUES TO DATA. In some cases, collected data will be based on scales other than that used by ECA. In such cases, the scales will have to be collapsed or expanded to fit the 4 scale values of the 5 interval ECA scale. Task criteria values may be of a descriptive nature rather than a quantitative one. Some subjective judgment may be required in order to equate a descriptive term with a quantitative score.

a. Examples:

(1) Task Learning Difficulty (TLD). A given task has a learning difficulty of 4.9 on a scale of 1 to 7. The 1 to 7 scale must be compressed and the 4.9 score must be equated with a score on a scale of 1 to 4. Simple interpolation results in--

$$4.9 \text{ is to } 7$$
$$\text{as}$$
$$x \text{ is to } 4$$
$$x = \frac{(4.9)\ (4)}{7}$$
$$x = 2.8$$

(2) Frequency Rate (FR). A given task is performed with a frequency of 4 on the following scale from 1 to 6:

1 = Annually	4 = Monthly
2 = Semiannually	5 = Weekly
3 = Quarterly	6 = Daily

The ECA frequency rate is evaluated on a scale of 1 to 4 as follows:

1 = Seldom (annually)
2 = Occasionally (semi-annually/quarterly)
3 = Often (monthly)
4 = Frequently (weekly/daily)

Through a visual comparison of the two scales, one can determine that the task performance frequency would be a 3 on the ECA scale.

(3) Task Performance Difficulty (TPD). A U.S. Army Research Institute (USARI) study indicates that a given task is moderately difficult to perform. The ECA methodology scores task performance difficulty on the following scale:

1 = Not difficult
2 = Somewhat difficult
3 = Moderately difficult
4 = Very difficult

The task should be given a score of 3 on the ECA scale.

b. SME opinion will always be scored on the 1 to 5 ECA scale.

c. Once the data collection effort is completed, perform the following tasks:

(1) Ensure that scores exist for all criteria used for each task. As a minimum, SME opinions should always be available.

(2) For SME opinion, average the values assigned to each criterion for each task. Scores of 5 are not considered.

(3) When averaging SME opinion, there may be a case in which the opinion of one SME differs significantly from the rest, or in which it appears that a SME did not conscientiously reply to the survey. If it is determined that the SME's response is unjustified, disregard it.

(4) Once SME opinion has been averaged, average that result with the values from each of the other data sources.

d. Each different data source (SME opinion, AOSP results, service school surveys, etc.) is weighted equally.

e. The following example should help to clarify the procedure up to this point:

(1) Example: A survey, administered to five SMEs, yields the following results:

TASK 1	PP	TLD	TPD	FR	DR	TT
SME 1	4	1	1	3	1	2
SME 2	3	1	1	3	1	3
SME 3	3	2	2	4	2	2
SME 4	3	2	1	4	3	1
SME 5	2	1	2	3	3	3
AVERAGE	3.0	1.4	1.4	3.4	2.0	2.2

(2) Additional information sources yield the following data:

(a) A service school survey conducted by the Directorate of Evaluation and Standardization (DOES) indicates that task 1 is performed by 75 percent of the MOS.

(b) U.S. Army Human Engineering Laboratory (HEL) studies indicate that task 1 is moderately difficult to perform.

(3) Based on the above data, the average values would be:

Average:	Percent Performing		Task Learning Difficulty	
	SME	3	SME	1.4
			HEL	3
	Svc Sch	3		
Average Value		3.0		2.2

f. Based on the above calculations, the data to be used for determining the ECA task score for task 1 is--

Task 1	PP	TLD	TPD	FR	DR	TT
	3.0	2.2	1.4	3.4	2.0	2.2

g. In each operation, round average value to the nearest tenth.

2-7. STEP 6. CALCULATE TASK SCORES. Once the criterion values for each data source have been averaged, the ECA task scores may be calculated. To calculate the ECA task scores, multiply the criterion values for each task.

a. ECA task score equals PP multiplied by the TLD multiplied by TPD multiplied by FR multiplied by the DR multiplied by the TT.

b. Using the calculation from paragraph 2-7a, the ECA task score for task 1 would be:

3.0 X 2.2 X 1.4 X 3.4 X 2.0 X 2.2 = 138.2

c. PP is omitted if data is not available.

2-8. STEP 7. IDENTIFY HIGH DRIVERS. A high driver is a system element which consumes an unusually large share of MPT resources. The ECA scoring methodology was developed through a series of studies on several weapon systems. Established cut-off scores identify potential high driver tasks:

a. 6 MPT Criteria = 216 (based on 2x2x2x3x3x3)

b. 5 MPT Criteria = 90 (based on 2x2x2.5x3x3)

c. High driver tasks are those that score 216 or higher in the case of 6 MPT criteria, or 90 or higher in the case of 5 MPT criteria. Tasks scoring below 216 or 90 respectively are not initially considered to be high drivers.

d. The SMEs should review all task scores and verify that the tasks scoring above the high driver cutoff are MPT resource intensive. They should also verify that the tasks scoring below the high driver cutoff are not resource intensive. The Director of Combat Development (DCD) should investigate discrepancies if the SME opinion identifies a high driver task even though the score was below the cutoff. In cases of discrepancies, the DCD will decide if the task is a valid high driver, document reasons for the decision, and adjust task scores, if appropriate.

2-9. STEP 8. CONDUCT TASK ANALYSIS. The purpose of task analysis is to break each high driver task into its individual steps.

a. Identify the tools and test equipment required to perform the task.

b. Identify the conditions under which the task must be performed.

c. Identify the standard to which the task must be performed.

Completed task analyses should be on file within the Directorate of Training Development (DOTD). If task analyses are not on file, they will have to be developed. In most cases, field and technical manuals will provide enough information to conduct a task analysis that is sufficient for the purposes of ECA.

2-10. STEP 9. CONDUCT LEARNING ANALYSIS. The purpose of the learning analysis is to identify which knowledge, skills, and abilities (KSAs) a soldier must possess to perform each high driver task under specified conditions to accepted standards. Assembling the KSAs for each step yields the cumulative KSAs required for the high driver task. Completed learning analyses may be available within the DOTD. If they are not available, learning analyses must be conducted. The level of detail found in a DOTD learning analysis is normally not required for the purposes of the ECA methodology. The procedures for conducting these learning analyses should consist of the following as a minimum:

a. A thorough review of the task analysis generated by step 8.

b. Determination of the MPT requirements for each step of the high driver task. How many people are needed to perform the step? What mental and physical attributes are required? What training/education is essential for each step?

2-11. STEP 10. IDENTIFY DEFICIENCIES. Identify KSAs required by the MOS. To determine deficiencies, compare KSAs required for each task with the KSAs required by the MOS.

a. The types of data that must be collected and analyzed include--

(1) Modified table of organization and equipment (MTOE)/table of distribution and allowances (TDA) authorizations in typical units.

(2) Personnel requirements for entry into the MOS.

(3) Personnel requirements for retention in the MOS.

(4) Personnel qualifications of accessions into the MOS.

(5) Personnel qualifications of personnel in the MOS.

(6) Soldier training.

(7) Soldier training strategy.

Data Types (1) through (6) can be obtained from FOOTPRINT on the Army Decision Support System (DSS). (See FOOTPRINT definition in Glossary, Appendix D.)

b. Compare the KSAs required to perform the task with the KSAs required by the MOS. This comparison will identify the MPT deficiencies. For example, if TPD is very high for a given task, it implies the task has high cognitive and/or high physical demands. Other examples of deficiency identification include--

(1) The learning analysis indicates the task requires a basic knowledge of algebra. If algebra is not a prerequisite for entry into the MOS and is not taught in advanced individual training (AIT), a deficiency exists.

(2) The learning analysis shows the soldier is required to carry a 75-pound item at least 20 feet. The physical demands rating of the MOS would be very heavy. A deficiency exists if the MOS has a physical demand rating of light.

(3) The learning analysis indicates the completion of the task requires an elementary knowledge of welding. If welding is not taught in the soldier's training, a deficiency exists.

2-12. STEP 11. IDENTIFY SOLUTIONS. Now that the deficiencies have been identified, list all possible MPT solutions.

a. Questions to be asked include--

(1) Manpower. Can manpower authorizations be increased? What trade-offs would be required? What would be the Army-wide impact? What are the projections for the MOS? Would the MOS still be supportable?

(2) Personnel. What quality has been coming into the MOS and what is projected? Can the quality of personnel be changed and still get the required quantity of accessions and retentions? Consider possible mental, physical, and educational requirements.

(3) Training. Can training be changed and still be supportable? Can a training aid or device be developed to resolve the deficiency? Can a current training aid or device be improved? Can simulation be employed to improve or enhance current training?

b. If an MPT solution is reasonable, the proponent should initiate it. If a MPT solution is not reasonable, a materiel change is necessary. The CD must specify these as MANPRINT constraints or goals in requirement documents. It then becomes the Materiel Developer's task to find a solution. Determination of the limits or flexibility existing in the MOS results in the development of preliminary MPT constraints for the conceptual system or product improvement.

2-13. STEP 12. PREPARE REPORT. After all preceding steps have been completed, a report will be prepared to document and disseminate findings. The format for the final report is in Appendix B. Participating service schools will submit a feeder report to the proponent service school. The proponent service school will prepare the consolidated final report. This report not only supports materiel requirements but also has many secondary uses. It provides useful data to DOTD, DOES, proponency office, potential contractors, and other interested organizations. As a minimum, the following types of information must be contained in the report:

a. Executive summary

b. Scope of the ECA

c. Sources for task lists and criteria data

d. Complete task lists, by MOS, by component, with values for all criteria and task scores

e. High drivers (list by MOS and component)

f. Solutions to high drivers

g. MPT constraints developed which influenced solution decisions

h. MPT data examined which will also be helpful in developing a target audience description

2-14. USAPIC RESPONSIBILITIES. Commander, USAPIC will--

a. Serve as the Army proponent for ECA.

b. Be available to review all ECA reports.

c. Make recommendations concerning the appropriateness of an ECA for a materiel system.

d. Develop ECA enhancements.

e. Provide advice and guidance on the ECA methodology.

f. Develop and publish ECA guidance and information.

CHAPTER 3

ECA RESOURCE MODEL

3.1. THE MODEL. The ECA methodology can be performed by personnel within the schools and centers. The model shown below will assist proponent service schools to estimate man-hour requirements for a specific ECA application. The key elements and their functional relationships are based on previous ECA application results.

a. This model for estimating ECA time requirements assumes the following:

(1) MOS task inventories and task and learning analyses are readily available.

(2) Ten SMEs per MOS are surveyed.

(3) The ratio of high driver tasks to total tasks is 2 per 100.

b. Use the estimates produced from this model for preliminary planning purposes only.

c. ECA Time Requirement (ECATR).

(1) ECATR = w + .5x + 8y + 13.3z + 51

(2) ECATR = ECA Time requirement

(3) w = number of data sources used (other than SME input)

(4) x = number of tasks evaluated

(5) y = number of MOS involved

(6) z = number of high drivers expected

3-2. STEP BY STEP. The estimated step-by-step man-hour requirement illustrates the flexibility associated with the model.

a. Step 1. Initiation. The time required depends on the amount of knowledge brought into the initiation session/discussion (approximately 1-8 man-hours).

b. Step 2. Identify relevant MOS. This is a direct outcome of step 1 decisions (1 man-hour).

c. Step 3. Develop task list. The time required depends

on the number of tasks involved and the availability of MOS task inventories. If MOS task lists are available, ask SMEs to validate them. If task lists must be compiled, approximately 15 minutes per task will be required.

d. Step 4. Collect data. Approximately seven minutes per task is required to administer and complete the SME questionnaires. An additional 2 hours is required for file search for other possible data sources.

e. Step 5. Assign values to task criteria. Approximately one hour per data source (other than SME) is required.

f. Step 6. Calculate the ECA task score. Approximately 8 minutes per task is required to compute task scores.

g. Step 7. Identify high drivers. Approximately 30 minutes per potential high driver is spent to validate high driver status.

h. Step 8. Conduct task analysis. Approximately 8.4 man-hours are required per high driver.

i. Step 9. Conduct learning analyses. Approximately 3.4 man-hours are required per high driver.

j. Step 10. Identify deficiencies. Approximately 1 hour per high driver and 4 hours per MOS are required.

k. Step 11. Determine solutions. Approximately 4 hours per MOS is required.

l. Step 12. Prepare report. Time estimates to prepare the final report range from 16-40 man-hours.

3-3. TIME. Time credited for involvement of SMEs, non-SME (other professional), and administrative time is provided to assist proponents in assessing the feasibility of contracting for an ECA.

	SME	NSME	Admin	Total
Step 1	1-8	0	0	1-8
Step 2	1	0	0	1
Step 3	.03x	.17x	.05x	.25x
Step 4	.10x	.02x	2	.12x + 2
Step 5	0	w	0	w
Step 6	0	0	.13x	.13x
Step 7	.50z	0	0	.50z
Step 8	.40z	4z	4z	8.40z
Step 9	.40z	2.50z	.50z	3.40z
Step 10	0	z	4y	z + 4y
Step 11	4y	0	0	4y
Step 12	0	8-16	8-24	16-40

a. SME = .13x + 4y + 1.3z + 9

b. NSME = w + .19x + 7.5z + 16

c. Admin = .18x + 4y + 4.50z + 26

d. ECATR = SME + NSME + ADMIN
= w + .5x + 8y + 13.3z + 51

3-4. MAN-HOURS. The following is an example of man-hour requirements to conduct an ECA on a system:

w = Number of data = 2

x = Number of tasks evaluated = 500

y = Number of MOS involved = 4

z = Number of high drivers expected = 10

a. ECATR = w + .5x + 8y + 13.3z + 51

= 2 + .5(500) + 8(4) + 13.3(10) + 51

= 2 + 250 + 32 + 133 + 51

= 468 man-hours

b. SME = .13x + 4y + 1.3z + 9

= .13(500) + 4(4) + 1.3(10) + 9

= 65 + 16 + 13 + 9

= 103 man-hours

c. NSME = w + .19x + 7.5z + 16

= 2 + .19(500) + 7.5(10) + 16

= 2 + 95 + 75 + 16

= 188 man-hours

d. Admin = .18x + 4y + 4.50z + 26

= .18(500) + 4(4) + 4.50(10) + 26

= 90 + 16 + 45 + 26

= 177 man-hours

3-5. ECA BY CONTRACTOR. The above model was developed for use in estimating the man-hour requirements of doing an ECA in-house. Increasingly, ECAs are being performed by contract. The basic model has utility in determining the requirements of a contracted effort but must be modified.

a. The Government must still provide subject matter experts. Thus, the contractor is providing non-subject matter expert and administrative resources. Typical labor categories appropriate for contracted ECAs include Analysis Manager, Senior Training Analyst, and Junior Training Analyst.

b. The contractor will be expected to attend initiation meetings and in-process reviews. These not only involve travel and per diem costs but also man-hours. They also will have to travel to collect data.

c. As the proponent for ECA, USAPIC personnel will be

available to assist in developing cost estimates for any contracted ECA application.

CHAPTER 4

ECA DOCUMENTATION

4-1. ECA DOCUMENTS. The ECA methodology, like any scientific study, should be thoroughly documented. Appendices A and B contain sample report and control/information formats. While the formats are not all inclusive, they are useful in documenting the application of ECA. The formats serve as guides, not requirements, and may be modified as necessary.

a. Report Documents

(1) Executive Summary

(2) Study Scope

(3) Study Limitations

(4) Sources

(5) Questionnaire Cover Letter

(6) Task List

(7) SME Questionnaire

(8) Task Scores

(9) MPT Constraints

(10) Manpower Status

(11) MOS Requirement Projections

(12) Retention Data*

(13) Accessions Over Time (Quality Distribution)*

(14) Accessions Over Time (Mental Categories)*

(15) Accessions Over Time (Aptitude Indicators)*

(16) Accessions Over Time (Gender)*

(17) Education Profile*

(18) Manpower Requirement Projections*

(19) EMF Data*

(20) POI Extract

*(12) through (19) available from FOOTPRINT on Army DSS.

b. Optional Control/Informational Documents

(1) Study Milestones

(2) Resource Requirements

(3) Problems Encountered Worksheet

APPENDIX A

REPORT DOCUMENTS

* (A-17 through A-24 available through Army DSS.)

EXECUTIVE SUMMARY

GROUND SURVEILLANCE RADARS

(Sample)

I. INTRODUCTION.

The purpose of this Early Comparability Analysis (ECA) was to assist the U.S. Army Intelligence Center and School (USAICS) in conducting a study on the AN/PPS-5A/B and the AN/PPS-15A(V)1. These predecessor systems were selected for study to furnish data to support the development of the Ground Surveillance Radars.

II. METHODOLOGY.

A. The ECA methodology was developed as a tool to assist Combat Developers (CD) in the timely and effective introduction of manpower, personnel, and training (MPT) considerations early in the system acquisition process. The early input of MPT information into the acquisition process can result in equipment design modifications which will lead to a more effective deployment and sustainment of new or improved weapon systems (the Ground Surveillance Radars).

B. The ECA methodology is based on a "lessons learned" approach to the design of a conceptual system. Problems are identified in the predecessor system and an attempt is made to determine a solution and "fix" the problem. Steps are then taken to ensure that the identified problems are resolved and are not built into the conceptual system.

C. The ECA methodology is based on an analysis of the operator, maintainer, and repairer tasks associated with the predecessor and/or reference systems. The methodology does not study crew level tasks. The analyst is primarily interested in determining which tasks, associated with predecessor/reference systems are MPT resource intensive. MPT resource intensive tasks are known as high drivers.

D. The twelve steps of the ECA methodology consist of the following:

1. Initiation
2. Identify relevant MOS
3. Collect task lists
4. Collect data
5. Assign values to data
6. Calculate task scores
7. Identify high drivers
8. Conduct task analysis
9. Conduct learning analysis

10. Identify deficiencies
11. Identify solutions
12. Prepare report

E. Each task on the SME questionnaires is rated on each of six criteria:

1. Percent Performing - What portion of the relevant MOS and skill level performs this task?

2. Task learning difficulty - How difficult is it for the average soldier to learn this task?

3. Task performance difficulty - How difficult is it for the average soldier to perform this task?

4. Frequency rate - On the average, how often is the task performed?

5. Decay rate - Given this task, how much proficiency is lost by the average soldier from the end of his/her formal training until he/she performs the task in the field?

6. Time to train - How much time is required to train the average soldier?

III. FINDINGS.

A. A total of 363 tasks was developed for the two Military Occupational Specialties (MOS) selected for this effort. The two MOS and number of tasks for each are the 96R - Ground Surveillance Systems Operator - 102 tasks; the 39C - Target Acquisition Surveillance Radar Repairer - 261 tasks.

B. Tasks with an ECA task score of 216 or higher are considered to be high drivers. For predecessor system AN/PPS-5A/B, MOS 96R, 3 out of 60 tasks were identified as high drivers; MOS 39C, 15 out of 226 tasks were identified as high drivers. The ECA on the predecessor system AN/PPS-15A(V)1 revealed no high driver tasks; however, the Technical Advisory Group (TAG) requested 2 MOS 96R tasks be analyzed as high drivers. A total of 20 high drivers were identified from the 363 tasks selected. This resulted in 5.5 percent of the tasks being identified as high drivers.

C. For additional information on each task identified as a high driver and the recommended solution, refer to the remaining sections of the report.

IV. CONCLUSIONS.

The analysis did not identify any deficiencies for which manpower or personnel was selected as the reasonable solution.

Approximately one-half of all the deficiencies identified during the high driver task analysis resulted in a training recommendation. The balance of the deficiencies identified during the high driver task analysis resulted in a system design recommendation. These were predominately testing and troubleshooting tasks and target identification tasks.

V. RECOMMENDATIONS FOR HIGH DRIVER TASKS.*

A. MOS 39C for AN/PPS-5A/B

1. Training

a. Add training in the testing of Radar Set AN/PPS-5A/B. (Training solution for the task: "Test radar set AN/PPS-5A/B.")

b. Increase the amount of training on repair of the various systems of the AN/PPS-5A/B, e.g., the Receiver-Transmitter and the Control-Indicator. (Training solution for the tasks: "Align radar set AN/PPS-5A/B," and "Repair radar set AN/PPS-5A/B.")

2. System Design

System Design recommendations were made on testing and troubleshooting (sectionalizing tasks) as well as those pertaining to the replacement and repair of the Block 1800 Wiring Harness. (System design solution for the tasks: "Replace block 1800 wiring harness," and "Test radar receiver-transmitter RT-692/PPS-5 and RT-965/B/PPS-5A.")

B. MOS 96R for AN/PPS-15A(V)1

1. Training

An increase of training is recommended for operation through jamming. (Training solution for the task "Operate AN/PPS-15 radar set through jamming.")

2. System Design

A system design recommendation is made for target identification. (System design solution for the task: "Identify targets (personnel, wheeled or tracked vehicles) located by AN/PPS-15.")

*Final Report Volumes I and II contain specifics on recommendations.

STUDY SCOPE

GROUND SURVEILLANCE RADARS

(Sample)

1. Predecessor Systems: AN/PPS-5A/B

AN/PPS-15A(V)1

2. Predecessor MOS Analyzed: AN/PPS-5A/B and AN/PPS-15A(V)1 have the same operator and maintainer MOS (96R and 39C).

a. 96R (operator) Ground Surveillance Systems Operator

b. 39C (maintainer) Target Acquisition Surveillance Radar Repairer

3. Number of Tasks by Predecessor and MOS:

a. AN/PPS-5A/B - 96R - 60 tasks

39C - 226 tasks

b. AN/PPS-15A(V)1 - 96R - 42 tasks

39C - 35 tasks

STUDY LIMITATIONS

GROUND SURVEILLANCE RADARS

(Sample)

1. Limited SMEs for one of two MOS studied - 8 were obtained for each radar predecessor for MOS 39C when the ideal number is 10-15.

2. Limited SME experience - MOS 39C SMEs were unable to answer the organizational maintenance section of the questionnaire.

3. Certain data, other than SME opinion, was not available, specifically, a Target Audience Description for MOS 96R.

NOTE: Recommend this document be prepared at the end of the ECA application.

SOURCES

FOR ANALYSIS OF PREDECESSORS ON

GROUND SURVEILLANCE RADARS

(Sample)

1. Sources for Task Lists:

a. AN/PPS-5A/B (Predecessor system)

(1) MOS 96R

(a) Soldier's Manual and Trainer's Guide (STP 34-96R10-SM-TG), MOS 96R, Feb 87.

(b) Technical Manual (11-5840-298-12), Maintenance Allocation Chart for Radar Set AN/PPS-5/A/B.

(c) Army Occupational Survey Program Questionnaire Booklet, MOS 17K, Aug 82.

(2) MOS 39C

(a) Soldier's Manual and Trainer's Guide (STP 6-39C10-SM-TG), MOS 39C, Dec 88.

(b) Technical Manual (11-5840-298-12), Maintenance Allocation Chart for Radar Set AN/PPS-5/A/B.

(c) Army Occupational Survey Program Questionnaire Booklet, MOS 39C, Oct 87.

b. AN/PPS-15A(V)1 (Predecessor system)

(1) MOS 96R

(a) Soldier's Manual and Trainer's Guide (STP 34-96R10-SM-TG), MOS 96R, Feb 87.

(b) Technical Manual (11-5840-347-13), Maintenance Allocation Chart for Radar Set, AN/PPS-15A(V)1, 28 Apr 78.

(c) Army Occupational Survey Program Questionnaire Booklet, MOS 17K, Aug 82.

(2) MOS 39C

(a) Technical Manual (11-5840-347-13), Maintenance Allocation Chart for Radar Set AN/PPS-15A(V)1, 28 Apr 78.

(b) Annotated Task List for MOS 39C, 22 Feb 89.

SME QUESTIONNAIRE COVER LETTER

Ground Surveillance Radars,
AN/PPS-5A/B and AN/PPS-15A(V)1

The U.S. Army Intelligence Center and School is conducting a study to collect all "lessons learned" on the AN/PPS-5A/B and AN/PPS-15A(V)1 to make sure that these lessons are used in the design of the next generation of battlefield surveillance radars. This study is called an Early Comparability Analysis or ECA. The ECA is one of the tools used in the Army's MANPRINT program to make sure that the soldier is considered when new equipment is being designed.

You have been selected as an SME because of your experience with GSRs. This "hands-on" experience with the equipment is very important to the accuracy of this study. The information you provide will have a direct influence on the design of the new equipment.

Please answer each question from the point of view of the average or typical soldier, in the proper MOS and skill level, that you have observed during your experience with these radars. If you have no experience with one or the other radars, or with any question, just leave the answer blank. The last page of the survey is available for any general comments that you may wish to add.

The results of the survey are strictly confidential. Your response will in no way be attributed to you by name. We ask for your honest evaluation on each of the tasks.

We appreciate your time and cooperation in completing this survey. Your honest responses will help provide important information needed to make far reaching decisions in the development of the future system.

SME QUESTIONNAIRE

MOS: 39C TITLE: TARGET ACQUISITION/SURVEILLANCE RADAR REPAIRER

MOS _____ SKILL LEVEL_____ CURRENT POSITION_____ _____ TYPE & AMOUNT OF EXPERIENCE WITH THE SYSTEM (e.g., Operator 2 yrs)_____ _____ _____	A. PERCENT PERFORMING 1 - 1-25% 2 - 26-50% 3 - 51-75% 4 - 76-100% 5 - NO OPINION/DON'T KNOW	B. TASK LEARNING DIFFICULTY 1 - NOT DIFFICULT 2 - SOMEWHAT DIFFICULT 3 - MODERATELY DIFFICULT 4 - VERY DIFFICULT 5 - NO OPINION/DON'T KNOW	C. TASK PERFORMANCE DIFFICULTY 1 - NOT DIFFICULT 2 - SOMEWHAT DIFFICULT 3 - MODERATELY DIFFICULT 4 - VERY DIFFICULT 5 - NO OPINION/DON'T KNOW	D. FREQUENCY RATE 1 - SELDOM (ANNUALLY) 2 - OCCASIONALLY (SEMI-ANNUALLY) 3 - OFTEN (MONTHLY) 4 - FREQUENTLY (WEEKLY/DAILY) 5 - NO OPINION/DON'T KNOW	E. DECAY RATE 1 - LOW 2 - MODERATELY LOW 3 - MODERATELY HIGH 4 - HIGH 5 - NO OPINION/DON'T KNOW	F. TIME TO TRAIN 1 - LESS THAN 3 HRS 2 - 3 HRS OR MORE BUT LESS THAN 6 3 - 6 HRS OR MORE BUT LESS THAN 9 4 - 9 HRS OR MORE 5 - NO OPINION/DON'T KNOW
1. **OPERATE RADAR SET AN/PPS-5**						
2. SETUP AN/PPS-5						
3. PERFORM INITIAL CHECKS						
4. SET PRELIMINARY CONTROL SETTINGS						
5. LEVEL RECEIVER-TRANSMITTER						
6. ALIGN TELESCOPE						
7. ORIENT RADAR SET AN/PPS-5						
8. PERFORM PRE-LIMINARY CHECKS						
9. PERFORM START-ING PROCEDURES						
10. PERFORM RADAR SELF-TEST						
11. ADJUST RE-CEIVER AND VIDEO GAIN CONTROLS						

TASK LIST FOR MOS 39C FOR AN/PPS-15A(V)1

SOURCE TASK NUMBER	TASK TITLE	SOURCE*
	OPERATE RADAR SET AN/PPS-15	
	SETUP AN/PPS-15	TM
	LEVEL RADAR SET	TM
	ORIENT RADAR SET	TM
	SET PRELIMINARY CONTROL SETTINGS	TM
	PERFORM INITIAL CHECKS	TM
	PERFORM INITIAL ADJUSTMENTS	TM
	SECTIONALIZE TROUBLES TO THE DEFECTIVE SUBSYSTEM IN RADAR SET AN/PPS-15	
061-296-1112	**PERFORM INTERMEDIATE MAINTENANCE ON RADAR SET AN/PPS-15**	TAD/ATL
00	ADJUST RADAR SET AN/PPS-15A(V)1	TM/MAC
00	TEST RADAR SET AN/PPS-15A(V)1	TM/MAC
00	REPLACE RADAR SET AN/PPS-15A(V)1	TM/MAC
00	REPAIR RADAR SET AN/PPS-15A(V)1	TM/MAC
02	REPLACE RADAR TRIPOD MT-4800/PPS-15(V)	TM/MAC
04	REPLACE TRANSPORT CASE CY-7338A/PPS-15(V)	TM/MAC
08	REPLACE PINTLE MOUNT ADAPTER MX-9426/PPS-15(V)	TM/MAC
	PERFORM INTERMEDIATE CORRECTIVE MAINTENANCE ON THE POWER SUBSYSTEM OF RADAR SET AN/PPS-15	
03	REPLACE GROUP-INTERCONNECTING CABLES	TM/MAC
0301	REPLACE EXTERNAL POWER CABLE	TM/MAC
0301	REPAIR EXTERNAL POWER CABLE	TM/MAC
030101	TEST REMOTE CONTROL CABLE	TM/MAC
030101	REPLACE REMOTE CONTROL CABLE	TM/MAC
	PERFORM INTERMEDIATE CORRECTIVE MAINTENANCE ON THE TRANSMITTER SUBSYSTEM OF RADAR SET AN/PPS-15	
06	ADJUST ANTENNA AS-2906A/PPS-15(V)	TM/MAC
06	TEST ANTENNA AS-2906A/PPS-15(V)	TM/MAC
06	REPLACE ANTENNA AS-2906A/PPS-15(V)	TM/MAC
06	ADJUST TRANSMITTER	TM/MAC
	PERFORM INTERMEDIATE CORRECTIVE MAINTENANCE ON THE RECEIVER SUBSYSTEM OF RADAR SET AN/PPS-15	
	PERFORM INTERMEDIATE CORRECTIVE MAINTENANCE ON THE ANTENNA POSITIONING SUBSYSTEM OF RADAR SET AN/PPS-15	
01	REPLACE ANTENNA DRIVE AB-1205A/PPS-15(V)	TM/MAC
01	REPAIR ANTENNA DRIVE AB-1205A/PPS-15(V)	TM/MAC
	PERFORM INTERMEDIATE CORRECTIVE MAINTENANCE ON THE TARGET INDICATING SUBSYSTEM OF RADAR SET AN/PPS-15	
04	TEST HEADSET(a) H-251( )/U	TM/MAC
04	REPLACE HEADSET(a) H-251( )/U	TM/MAC
05	REPLACE CARRYING CASE CY-7332A/PPS-15(V)	TM/MAC
07	TEST CONTROL-INDICATOR C-9353A/PPS-15(V)	TM/MAC
07	REPLACE CONTROL-INDICATOR C-9353A/PPS-15(V)	TM/MAC

TASK SCORES

FOR AN/PPS-15A (V) 1

MOS 39C

TASK NUMBER	PP	TLD	TPD	FR	DR	TT	TASK SCORE	# OF SMEs/ TOTAL SMEs
11	2.71	2.29	2.14	2.71	2.00	2.71	195.07	7/8
31	2.50	2.17	2.00	2.50	1.83	1.83	90.84	6/8
9	2.71	1.88	1.75	3.13	1.75	1.50	73.26	8/8
7	2.71	1.88	1.75	2.63	1.75	1.75	71.81	8/8
25	2.33	2.00	2.00	2.17	2.00	1.50	60.67	6/8
8	2.57	1.75	1.75	3.13	1.75	1.38	59.49	8/8
35	2.43	1.57	1.43	3.43	1.43	1.29	34.52	7/8
21	2.43	1.63	1.50	2.50	1.75	1.25	32.49	8/8
17	2.50	1.57	1.71	2.57	1.57	1.00	27.08	7/8
4	2.71	1.38	1.38	3.13	1.63	1.00	26.33	8/8
6	2.71	1.38	1.38	3.13	1.63	1.00	26.33	8/8
3	3.00	1.50	1.50	3.00	1.25	1.00	25.31	4/8
29	2.71	1.38	1.38	3.00	1.38	1.13	24.14	8/8
34	2.29	1.50	1.38	3.13	1.38	1.13	23.14	8/8
24	2.33	1.57	1.71	1.71	1.86	1.14	22.68	7/8
33	2.60	1.40	1.80	1.80	1.60	1.20	22.64	5/8
20	2.29	1.63	1.63	2.25	1.63	1.00	22.31	8/8
23	2.00	1.80	2.00	1.40	1.80	1.20	21.77	5/8
5	2.71	1.25	1.25	3.13	1.63	1.00	21.60	8/8
32	2.57	1.38	1.38	2.75	1.25	1.25	21.03	8/8
1	3.40	1.17	1.17	3.67	1.17	1.00	19.98	6/8
12	3.25	1.20	1.20	2.40	1.20	1.20	16.17	5/8
22	2.60	1.33	1.33	2.17	1.33	1.17	15.53	6/8
2	2.75	1.20	1.20	3.20	1.00	1.00	12.67	5/8
16	2.40	1.00	1.00	4.20	1.17	1.00	11.79	6/8
18	2.71	1.13	1.13	2.88	1.13	1.00	11.26	8/8
26	2.43	1.13	1.13	2.50	1.13	1.00	8.77	8/8
13	2.67	1.00	1.00	2.00	1.33	1.00	7.10	3/8
19	2.60	1.00	1.00	2.33	1.17	1.00	7.09	6/8
10	2.25	1.00	1.00	3.00	1.00	1.00	6.75	5/8
27	3.25	1.00	1.00	2.00	1.00	1.00	6.50	5/8
30	2.33	1.00	1.00	2.50	1.00	1.00	5.83	6/8
15	2.40	1.00	1.00	1.83	1.17	1.00	5.14	6/8
14	2.67	1.00	1.00	1.33	1.33	1.00	4.72	3/8
28	2.00	1.00	1.00	1.00	1.00	1.00	2.00	3/8

MPT CONSTRAINTS

GROUND SURVEILLANCE RADARS

(Sample)

1. MANPOWER. Manpower requirements for the Ground Surveillance Radars cannot exceed those for the current system which are:

a. AN/PPS-5A/B - Crew-MOS 96R: 3 soldiers per radar
DS/GS Maintenance-MOS 39C: 1 soldier per battalion

b. AN/PPS-15A(V)1 - Crew-MOS 96R: 2 soldiers per radar in airborne unit; 3 soldiers per radar in light infantry unit
DS/GS Maintenance-MOS 39C: 1 soldier per battalion

See report for:
a. Total MOS authorizations - current and projected.
b. Selected representative MTOEs.

2. PERSONNEL.

a. Personnel requirements for the Ground Surveillance Radars cannot exceed those for the current system.

(1) Quality Distribution

MOS	CAT I-IIIA	CAT IIIB	CAT IV
39C	81	7	5
96R	79	16	4

(2) Aptitude Description

MOS	APT AREA	MINIMUM SCORE
39C	EL	115
96E	EL	85
	SC	95

(3) Physical Qualification

MOS	P	U	L	H	E	S
39C	1	1	1	2	2	1
96R	2	2	2	1	2	1

(4) Civilian Education

MOS	
39C	One year HS Algebra and Science
96R	HSG or equivalent

3. TRAINING.

1. AN/PPS-5A/B:

a. MOS 96R tasks requiring institutional training cannot exceed one and one-half classroom hours, with 40 hours of practical exercise.

b. Student/instructor ratio cannot exceed 6 students per instructor for MOS 96R.

c. See report for POI information for both MOS 96R and 39C.

2. AN/PPS-15A(V)1:

a. MOS 96R tasks requiring institutional training cannot exceed one classroom hour, with 18 hours of practical exercise.

b. Student/instructor ratio cannot exceed 6 students per instructor for MOS 96R.

c. See report for POI information for both MOS 96R and 39C.

MANPOWER STATUS

		AS OF SEP 87			AS OF SEP 88			AS OF SEP 89		
MOS	GRADE	AUTH	OPER	%	AUTH	OPER	%	AUTH	OPER	%
39C	E6	41	42	102	37	42	114	40	40	100
	E5	48	57	119	38	36	95	34	54	159
	E4	105	92	88	118	69	58	125	58	46
	E3-E1	59	12	20	49	12	24	42	62	148
MOS TOTALS		253	203	80	242	159	66	241	214	89
96R	E9	0	2	0	0	1	0	0	0	0
	E8	36	26	72	36	19	53	37	25	68
	E7	48	64	133	59	70	119	62	71	115
	E6	145	146	101	171	152	89	157	155	99
	E5	231	230	100	250	234	94	265	282	106
	E4	244	262	107	398	249	63	436	311	71
	E3-E1	293	134	46	214	313	146	222	376	169
MOS TOTALS		997	864	87	1128	1038	92	1179	1220	103

SOURCES: FORCE MANAGEMENT BOOK, VOLUME I OF II, MOS 39C, JANUARY 1989 AND FY 1989.
FORCE MANAGEMENT BOOK, VOLUME II OF II, MOS 96R, JANUARY 1989 AND FY 1989.

MOS REQUIREMENT PROJECTIONS

MOS	GRADE	FY88	FY89	FY90	FY91	FY92	FY93	FY94	DELTA	
39C	E6	38	39	46	48	49	48	48	+10	+30.0%
	E5	38	34	67	67	67	67	67	+29	+80.0%
	E4	118	124	94	94	97	98	98	-20	-20.0%
	E3	49	44	39	40	37	37	37	-12	-20.0%
MOS TOTALS		243	241	246	249	250	250	250	+7	+0.0%
96R	E8	35	36	37	37	36	36	38	+3	+10.0%
	E7	58	57	54	54	54	54	58	+0	+0.0%
	E6	171	144	135	138	139	139	142	-29	-20.0%
	E5	250	258	269	265	262	262	258	+8	+0.0%
	E4	399	425	447	424	414	414	409	+10	+0.0%
	E3	216	218	231	240	242	242	242	+26	+10.0%
MOS TOTALS		1129	1138	1173	1158	1147	1147	1147	+18	+0.0%

SOURCE: FORCE STRUCTURE AND PERSONNEL REQUIREMENTS DIRECTORATE, 31 AUGUST 1988.

RETENTION DATA*

	FY 85	FY 86	FY 87
MOS: 96R			
FIRST TERMERS (0-4 YRS)	269	260	259
MID-CAREERISTS (5-10 YRS)	118	331	268
CAREERISTS (11-20 YRS)	76	295	324
CAREERISTS (>20 YRS)	3	11	13
MOS TOTALS	466	897	864

* NO DATA WAS AVAILABLE FOR MOS 39C.

SOURCE: FOOTPRINT, REPORT 10, MOS 96R; REPORT DATE: 06/01/89.

ACCESSIONS OVER TIME
(QUALITY DISTRIBUTION)

	NPS PROG	NPS FILL	% FILL	1-3A TGT%	1-3A FILL%	3B TGT%	3B FILL%	IV TGT%	IV FILL%	%DG NPS
MOS: 39C										
FY 1987	NO DATA WAS AVAILABLE.									
FY 1988	67	38	56.7	95.0	100.0	5.0	0.0	0.0	0.0	100.0
FY 1989	70	70	100.0	95.0	97.1	5.0	2.9	0.0	0.0	100.0
MOS: 96R										
FY 1987	193	187	96.9	85.0	83.4	15.0	16.0	0.0	0.5	84.5
FY 1988	311	301	96.8	85.0	83.1	15.0	16.6	0.0	0.3	85.7
FY 1989	351	200	57.0	85.0	86.5	15.0	13.5	0.0	0.0	100.0

SOURCES: FY 1987 MOS SEABROOK REPORT, 08/05/87.
FY 1988 MOS SEABROOK REPORT, 10/06/88.
FY 1989 MOS SEABROOK REPORT, 10/06/88.

ACCESSIONS OVER TIME
(MENTAL CATEGORIES - %)

MOS	CATEGORY	FY 85	FY 86	FY 87	FY 88
39C	I			.13	
	II			.81	
	IIIA			.06	
TOTALS				1.00	
96R	I	.02	.09	.08	.05
	II	.48	.53	.43	.44
	IIIA	.24	.31	.25	.36
	IIIB	.21	.03	.25	.15
	IV	.05	.03	.00	.00
TOTALS		1.00	1.00	1.00	1.00

SOURCES: FOOTPRINT, REPORT 1, MOS 39C; REPORT DATE: 06/24/88.
FOOTPRINT, REPORT 1, MOS 96R; REPORT DATE: 06/01/89.

ACCESSIONS OVER TIME
(APTITUDE INDICATORS - %)

MOS	SCORE	FY 85	FY 86	FY 87	FY 88
MIN AA: EL 115					
39C	106-110			.06	
	111-115			.13	
	116-120			.19	
	>120			.63	
TOTALS				1.00	
MIN AA: EL 85 AND SC 95					
96R	85-90	.02	.00	.00	.00
	91-95	.06	.03	.07	.07
	96-100	.08	.06	.13	.11
	101-105	.13	.09	.19	.11
	106-110	.15	.13	.11	.09
	111-115	.19	.13	.15	.13
	116-120	.19	.19	.12	.11
	>120	.18	.38	.25	.17
	UNKNOWN	.00	.00	.00	.22
TOTALS		1.00	1.00	1.00	1.00

SOURCES: FOOTPRINT, REPORT 2, MOS 39C; REPORT DATE: 06/24/88.
FOOTPRINT, REPORT 2, MOS 96R; REPORT DATE: 06/01/89.

ACCESSIONS OVER TIME
(GENDER)

	FY 85		FY 86		FY 87		FY 88	
	Q	%	Q	%	Q	%	Q	%
MOS: 39C								
MALE					105	.95		
FEMALE					6	.05		
MOS TOTALS					111	1.00		
MOS: 96R								
MALE	629	1.00	1143	1.00	995	1.00	1182	1.00
FEMALE	0	.00	0	.00	0	.00	1	.00
MOS TOTALS	629	1.00	1143	1.00	995	1.00	1183	1.00

Q = QUANTITY
% = PERCENTAGE

SOURCES: FOOTPRINT, REPORT 20, MOS 39C; REPORT DATE: 06/24/88.
FOOTPRINT, REPORT 20, MOS 96R; REPORT DATE: 06/01/89.

EDUCATION PROFILE
(ACTIVE DUTY ENLISTED ONLY)

	E1-4 Q & %	E5 Q & %	E6 Q & %	E7 Q & %	E8-9 Q & %	TOTALS Q & %
MOS: 39C						
HSG & ABOVE	57 .98	31 .97	21 1.00			109 .98
N-HSG	1 .02	1 .03	0 .00			2 .02
MOS TOTALS	58 1.00	32 1.00	21 1.00			111 1.00
MOS: 96R						
HSG & ABOVE	589 .50	215 .18	142 .12	67 .06	22 .02	1035 .87
GED	66 .06	33 .03	22 .02	7 .01	5 .00	133 .11
N-HSG	13 .01	2 .00	0 .00	0 .00	0 .00	15 .01
MOS TOTALS	668 .56	250 .21	164 .14	74 .06	27 .02	1183 1.00

Q = QUANTITY
% = PERCENTAGE

SOURCES: FOOTPRINT, REPORT 6, MOS 39C; REPORT DATE: 06/24/88.
FOOTPRINT, REPORT 6, MOS 96R; REPORT DATE: 06/01/89.

MANPOWER REQUIREMENT PROJECTIONS

AUTHORIZATIONS

	FY 87 O & %	FY 88 O & %	FY 89 O & %	FY 90 O & %	FY 91 O & %	FY 92 O & %	FY 93 O & %	CUM O & %
MOS: 39C								
E1-4	170	175	179	143	142	142	142	1093
	.65	.72	.73	.60	.59	.59	.59	.64
E5	50	37	35	65	65	65	65	382
	.19	.15	.14	.27	.27	.27	.27	.22
E6	42	32	32	32	32	32	32	234
	.16	.13	.13	.13	.13	.13	.13	.14
MOS TOTALS	262	244	246	240	239	239	239	1709
	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MOS: 96R								
E1-4		600	678	701	679	649	649	4605
		.55	.56	.55	.55	.55	.55	.55
E5		246	270	279	267	255	255	1827
		.23	.22	.22	.22	.22	.22	.22
E6		153	159	173	176	168	168	1143
		.14	.13	.14	.14	.14	.14	.14
E6		55	64	79	73	72	72	471
		.05	.05	.06	.06	.06	.06	.06
E8-9		34	38	41	40	40	40	271
		.03	.03	.03	.03	.03	.03	.03
MOS TOTALS		1088	1209	1273	1235	1184	1184	8317
		1.00	1.00	1.00	1.00	1.00	1.00	1.00

SOURCES: FOOTPRINT, REPORT 26, MOS 39C; REPORT DATE: 06/24/88.
FOOTPRINT, REPORT 26, MOS 96R; REPORT DATE: 06/01/89.

EMF DATA
APTITUDE INDICATORS
BY MOS

GROUND SURVEILLANCE RADARS

(Sample)

MOS	SL	HSG	GED	NHSG	AFQT MEAN	AA	MIN SCORE	MEAN
39C	1	96%	0%	1%	74	EL	115	119
	2	89%	5%	5%	56			
96R	1	88%	10%	2%	62	EL	85	109
	2	86%	13%	1%	52	SC	95	

SOURCES: FOOTPRINT, REPORT 14, MOS 39C; REPORT DATE: 11/13/90
FOOTPRINT, REPORT 14, MOS 96R; REPORT DATE: 11/13/90

SAMPLE POI EXTRACT

SPECIFIC TASK TRAINING - RADAR SET AN/PPS-15(V)1

MOS 96R

Task	Time to Train*
Set up AN/PPS-15.	2.0 hours
Level Radar Set.	1.0 hours
Orient Radar Set.	3.0 hours
Set preliminary control settings.	1.0 hours
Perform initial checks.	2.0 hours
Perform initial adjustments.	2.0 hours
Subtotal	11.0 hours
Transferrable skills	0.0 hours
Total	11.0 hours

TRAINING INFORMATION TO ALSO INCLUDE:

Class Size--Maximum, Minimum, Optimum
Class Frequency
Student/Instructor Ratio
Attrition Rate
Total Course Length
Training Aids/Devices/Simulators

APPENDIX B

OPTIONAL CONTROL DOCUMENTS

B-2 Study Milestones

B-3 Resource Requirements

B-4 Problems Encountered Worksheet

STUDY MILESTONES

(Sample)

STEP	START DATE	MILESTONE DATECOMPLETION DATE
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		

NOTE: This document is intended for in-house use only.

RESOURCE REQUIREMENTS

(Sample)

1. PERSONNEL

2. ADMINISTRATIVE SUPPORT

3. SUPPLIES AND EQUIPMENT

NOTE: At the beginning of an ECA application, identify resource requirements to preclude future delays.

PROBLEMS ENCOUNTERED WORKSHEET

(Sample)

1. PROBLEM:

2. DISCUSSION:

3. RECOMMENDATION:

NOTE: This form is intended to record lessons learned information for use in future ECAs.

APPENDIX C

ACRONYMS

AAO	ARMY ACQUISITION OBJECTIVE
AAE	ARMY ACQUISITION EXECUTIVE
AAMMH	ANNUAL AVAILABLE MAINTENANCE MAN-HOURS
ACF	ABBREVIATED COST FORM
ADATS	ARMY DEVELOPMENT AND ACQUISITION OF THREAT SIMULATORS
ADDEV	ADVANCED DEVELOPMENT
ADEA	ARMY DEVELOPMENT AND EMPLOYMENT AGENCY
ADP	AUTOMATED DATA PROCESSING
AEP	ANNUAL EXECUTION PLAN
AFARS	ARMY FEDERAL ACQUISITION REGULATION SUPPLEMENT
AFQT	ARMED FORCES QUALIFICATION TEST
AG	ARMY GUIDANCE
AIT	ADVANCED INDIVIDUAL TRAINING
AMC	US ARMY MATERIEL COMMAND
AMIM	ARMY MODERNIZATION INFORMATION MEMORANDUM
AMMED	ARMY MEDICAL DEPARTMENT
AMMH	ANNUAL MAINTENANCE MAN-HOURS
AMO	AUTOMATION MANAGEMENT OFFICE
AMOPS	ARMY MOBILIZATION OPERATIONS PLAN SYSTEM
AMP	ARMY MATERIEL PLAN
AMSAA	ARMY MATERIEL SYSTEMS ANALYSIS ACTIVITY (AMC)
AMT	ARMY MODERNIZATION TRAINING
AMTAS	ARMY MODERNIZATION TRAINING AUTOMATION SYSTEM
ANCOC	ADVANCED NONCOMMISSIONED OFFICER COURSE
AOP	ADDITIVE OPERATIONAL PROJECT
AOSP	ARMY OCCUPATIONAL SURVEY PROGRAM
AP	ACQUISITION PLAN
APDM	AMENDED PROGRAM DECISION MEMORANDUM
APP	ADVANCED PROCUREMENT PLAN
APRB	ACQUISITION PLAN REVIEW BOARD
AR	ARMY REGULATION
ARI	US ARMY RESEARCH INSTITUTE FOR BEHAVIORAL AND SOCIAL SCIENCES
ARPERCEN	US ARMY RESERVE PERSONNEL CENTER
ARPRINT	ARMY PROGRAM FOR INDIVIDUAL TRAINING
ARSTAFF	ARMY STAFF
ART	ARMY REGIONAL THREATS
ARTEP	ARMY TRAINING AND EVALUATION PROGRAM
AS	ACQUISITION STRATEGY
ASA	ARMY STRATEGIC APPRAISAL
ASARC	ARMY SYSTEMS ACQUISITION REVIEW COUNCIL
ASE	ASSOCIATED SUPPORT EQUIPMENT
ASI	ADDITIONAL SKILL IDENTIFIER
ASIOE	ASSOCIATED SUPPORT ITEMS OF EQUIPMENT
ASL	AUTHORIZED STOCKAGE LIST
ASVAB	ARMED SERVICES VOCATIONAL APTITUDE BATTERY
ATC	ARMY TRAINING CENTER
ATE	AUTOMATIC TEST EQUIPMENT
ATTRS	ARMY TRAINING REQUIREMENTS AND RESOURCES SYSTEM

ATSC	ARMY TRAINING SUPPORT CENTER
AURS	AUTOMATED UNIT REFERENCE SHEET
AVIM	AVIATION INTERMEDIATE MAINTENANCE
AVUM	AVIATION UNIT MAINTENANCE
BAS	BATTLEFIELD AUTOMATED SYSTEM
BCE	BASELINE COST ESTIMATE
BCS	BASELINE COMPARISON SYSTEM
BDP	BATTLEFIELD DEVELOPMENT PLAN
BEG	BUDGET ESTIMATE GUIDANCE
BITE	BUILT-IN TEST EQUIPMENT
BMAR	BACKLOG OF MAINTENANCE AND REPAIR
BMG	BUDGET AND MANPOWER GUIDANCE
BNOC	BASIC NONCOMMISSIONED OFFICER COURSE
BOA	BASIC ORDERING AGREEMENT
BOC	BEST OPERATIONAL CAPABILITY
BOIP	BASIS OF ISSUE PLAN
BT	BASIC TRAINING
BTA	BEST TECHNICAL APPROACH
BY	BUDGET YEAR
CAC	COMBINED ARMS CENTER
CAD	COURSE ADMINISTRATIVE DATA COMPUTER AIDED DIAGONISTICS
CAG	COST ADVISORY GROUP
CAP	CONTRACTOR ACQUIRED PROPERTY
CAPCAT	CAPABILITY CATEGORY
CARDS	CATALOG OF APPROVED REQUIREMENT DOCUMENTS
CASCOM	COMBINED ARMS SUPPORT COMMAND
CBI	COMPUTER BASED INSTRUCTIONS
CBRS	CONCEPT BASED REQUIREMENT SYSTEM
CD	COMBAT DEVELOPER/COORDINATING DRAFT
CDEC	COMBAT DEVELOPMENTS EXPERIMENTATION CENTER
CDRL	CONTRACT DATA REQUIREMENTS LIST
CE	CONCEPT EXPLORATION
C2E	CONTINUOUS AND COMPREHENSIVE EVALUATION
CECDC	COST ESTIMATE CONTROL DATA CENTER
CEP	CONCEPT EVALUATION PROGRAM
CER	COST ESTIMATING RELATIONSHIPS
CFP	CONCEPT FORMULATION PACKAGE
CI	CONFIGURATION ITEM
CLIN	CONTRACT LINE NUMBER
CM	CORRECTIVE MAINTENANCE
CMP	CONFIGURATION MANAGEMENT PLAN
COB	COMMAND OPERATING BUDGET
CODAP	COMPREHENSIVE OCCUPATIONAL DATA ANALYSIS PROGRAMS
COEA	COST AND OPERATIONAL EFFECTIVENESS ANALYSIS
COR	CONTRACTING OFFICER'S REPRESENTATIVE
COTR	CONTRACTING OFFICER'S TECHNICAL REPRESENTATIVE
CP	COMBAT POWER
CSWS	CORPS SUPPORT WEAPONS SYSTEM
CTA	COMMON TABLE OF ALLOWANCES
CTDR	COMMERCIAL TRAINING DEVICE REQUIREMENT
CTEA	COST AND TRAINING EFFECTIVENESS ANALYSIS

CTP	COORDINATED TEST PROGRAM
CTT	COMMON TASK TRAINING
CTU	CONSOLIDATED TOE UPDATE
DAE	DEFENSE ACQUISITION EXECUTIVE
DAMPL	DEPARTMENT OF THE ARMY MASTER PRIORITY LIST
DAP	DESIGNATED ACQUISITION PLAN DESIGNATED ACQUISITION PROGRAM
DAPR	DEPARTMENT OF THE ARMY PROGRAM REVIEW
DCD	DIRECTOR OF COMBAT DEVELOPMENT
DCP	DECISION COORDINATING PAPER
DCSPER	DEPUTY CHIEF OF STAFF FOR PERSONNEL
DEP	DRAFT EQUIPMENT PUBLICATIONS
DET	DISPLACED EQUIPMENT TRAINING
DID	DATA ITEM DESCRIPTION
DMAR	DEFERRED MAINTENANCE AND REPAIR
DMDC	DEFENSE MANAGEMENT DATA CENTER
DMWR	DEPOT MAINTENANCE WORK REQUIREMENTS
DOD-STD	DEPARTMENT OF DEFENSE STANDARD
DOT	DICTIONARY OF OCCUPATIONAL TITLES
DOTD	DIRECTORATE OF TRAINING AND DOCTRINE
DPAMMH	DIRECT PRODUCTIVE ANNUAL MAINTENANCE MAN-HOURS
DQ	DISTRIBUTION OF QUALITY
DR	DATA REQUIREMENT
DRB	DEFENSE RESOURCES BOARD
DSARC	DEFENSE SYSTEM ACQUISITION REVIEW COUNCIL (NOW JRMB)
DSWS	DIVISION SUPPORT WEAPONS SYSTEM
DT	DEVELOPMENT TEST
DT&E	DEVELOPMENT TEST & EVALUATION
DTC	DESIGN-TO-COST
DTIC	DEFENSE TECHNICAL INFORMATION CENTER
DTP	DETAILED TEST PLAN
DTTP	DOCTRINE AND TACTICS TRAINING PLAN
DTUPC	DESIGN-TO-UNIT PRODUCTION COST
DX	DIRECT EXCHANGE
DY	DESIGN YEAR
EA	ENVIRONMENTAL ASSESSMENT
EAD	EQUIPMENT AVAILABILITY DATE
ECA	EARLY COMPARABILITY ANALYSIS
ECP	ENGINEERING CHANGE PROPOSAL
ED	ENGINEERING DEVELOPMENT
EDS	ELECTRONIC DATA SYSTEMS
EDT	ENGINEERING DESIGN TESTING
EIC	EQUIPMENT IDENTIFICATION CODE
EIR	EQUIPMENT IMPROVEMENT REPORTS
EIS	ENVIRONMENTAL IMPACT STATEMENT
EMF	ENLISTED MASTER FILE
EPA	ENVIRONMENTAL PROTECTION AGENCY EXTENDED PLANNING INDEX
EPMS	ENLISTED PERSONNEL MANAGEMENT SYSTEM
ET	ENGINEERING TEST

	EMBEDDED TRAINING
ETM	EXTENSION TRAINING MATERIAL
EUTE	EARLY UNIT TEST AND EVALUATION
EW	ELECTRONIC WARFARE
FA-IPT	FIRST ARTICLE-INITIAL PRODUCTION TEST
FAA	FUNCTIONAL AREA ASSESSMENT
FAR	FEDERAL ACQUISITION REGULATION
FAT	FIRST ARTICLE TEST
FBOIP	FINAL BASIS OF ISSUE PLAN
FDTE	FORCE DEVELOPMENT TESTING AND EXPERIMENTATION
FEA	FRONT-END ANALYSIS
FGC	FUNCTIONAL GROUP CODE
FHP	FLYING HOUR PROGRAM
FI	FORCE INTEGRATION
FMMP	FORCE MODERNIZATION MASTER PLAN
FMMRS	FORCE MODERNIZATION MILESTONE REPORTING SYSTEM
FOE	FOLLOW-ON EVALUATION
FOT&E	FOLLOW-ON OPERATIONAL TEST AND EVALUATION
FPD	FUNCTIONAL PURCHASE DESCRIPTION
FQQPRI	FINAL QUALITATIVE AND QUANTITATIVE PERSONNEL REQUIREMENTS INFORMATION
FS	FEASIBILITY STUDY
FSA	FOREIGN SYSTEMS ACQUISITION
FSD	FULL-SCALE DEVELOPMENT
FSED	FULL-SCALE ENGINEERING DEVELOPMENT
FUE	FIRST UNIT EQUIPPED
FUED	FIRST UNIT EQUIPPED DATE
FYDP	FIVE-YEAR DEFENSE PLAN
FYTP	FIVE-YEAR TEST PLAN
GFI	GOVERNMENT FURNISHED INFORMATION
GFP	GOVERNMENT FURNISHED PROPERTY
HARDMAN	HARDWARE VERSUS MANPOWER
HCM	HARDMAN COMPARABILITY METHODOLOGY
HEL	US ARMY HUMAN ENGINEERING LABORATORY
HFE	HUMAN FACTORS ENGINEERING
HFEA	HUMAN FACTORS ENGINEERING ANALYSIS
HHA	HEALTH HAZARD ASSESSMENT
HHAR	HEALTH HAZARD ASSESSMENT REPORT
HIP	HOWITZER IMPROVEMENT PROGRAM
HIPO	HIERARCHIAL AND INPUT/PROCESS/OUTPUT TECHNIQUES
I/S	INSTRUCTOR-TO-STUDENT RATIO
IC	INTEGRATING CENTER
ICE	INDEPENDENT COST ESTIMATE
ICH	INSTRUCTOR COURSE HOURS
ICTP	INDIVIDUAL AND COLLECTIVE TRAINING PLAN (SEE STRAP)
IE	INDEPENDENT EVALUATION
IEP	INDEPENDENT EVALUATION PLAN
IER	INDIVIDUAL EVALUATION REPORT
IET	INITIAL ENTRY TRAINING

IEW	INTELLIGENCE AND ELECTRONIC WARFARE
IFB	INVITATION FOR BID
IFF	IDENTIFICATION, FRIEND OR FOE
IKP	INSTRUCTOR AND KEY PERSONNEL
ILS	INTEGRATED LOGISTICS SUPPORT
ILSMRS	INTEGRATED LOGISTICS SUPPORT MILESTONE REPORTING SYSTEM
ILSMT	INTEGRATED LOGISTICS SUPPORT MANAGEMENT TEAM
ILSP	INTEGRATED LOGISTICS SUPPORT PLAN
ILSR	INTEGRATED LOGISTICS SUPPORT REVIEW
IMA	INDIVIDUAL MOBILIZATION AUGMENTEE
IOT&E	INITIAL OPERATIONAL TEST AND EVALUATION
IOC	INITIAL OPERATIONAL CAPABILITY
IPD	INSTITUTE OF PROFESSIONAL DEVELOPMENT
IPR	IN-PROCESS/IN-PROGRESS REVIEW
IPS	INTEGRATED PROGRAM SUMMARY
IRR	INDIVIDUAL READY RESERVE
ISD	INSTRUCTIONAL SYSTEMS DEVELOPMENT
ISP	INTEGRATED SUPPORT PLAN
ITEP	INDIVIDUAL TRAINING EVALUATION PROGRAM
ITP	INDIVIDUAL TRAINING PLAN
ITPP	INDIVIDUAL TRAINING PLAN PROPOSAL
JB	JOB BOOK
JMSNS	JUSTIFICATION FOR MAJOR SYSTEM NEW START
JPAM	JOINT PROGRAM ASSESSMENT MEMORANDUM
JSOR	JOINT SERVICES OPERATIONAL REQUIREMENT
JSP	JOINT SERVICES PROGRAM
JSPD	JOINT STRATEGIC PLANNING DOCUMENT
JSPS	JOINT STRATEGIC PLANNING ALLOWANCES
JTA	JOINT TABLE OF ALLOWANCES
JWG	JOINT WORKING GROUP
LCC	LIFE CYCLE COSTS
LCN	LOGISTICS SUPPORT ANALYSIS CONTROL NUMBER
LCSMM	LIFE CYCLE SYSTEM MANAGEMENT MODEL
LD	LOGISTICS DEMONSTRATION
LEA	US ARMY LOGISTICS EVALUATION AGENCY
LIN	LINE ITEM NUMBER
LOA	LETTER OF AGREEMENT
LOGCAP	LOGISTICS AND COMMAND ASSESSMENT OF PROJECTS
LOGSACS	LOGISTICS STRUCTURE AND COMPOSITION SYSTEM
LOI	LETTER OF INSTRUCTION
LON	LETTER OF NOTIFICATION
LP	LIMITED PROCUREMENT
LR	LETTER REQUIREMENT
LRIP	LOW RATE INITIAL PRODUCTION
LRRDAP	LONG-RANGE RESEARCH, DEVELOPMENT, AND ACQUISITION PLAN
LRU	LOWEST REPLACEABLE UNIT LINE REPLACEABLE UNIT
LSA	LOGISTICAL SUPPORT ANALYSIS
LSAR	LOGISTICAL SUPPORT ANALYSIS RECORD
LSI	LARGE-SCALE INTEGRATION

LSR	LOGISTICS STATUS REVIEW
M&R	MAINTENANCE AND REPAIR
MA	MAINTAINABILITY ASSESSMENT
MAA	MISSION AREA ANALYSIS
MAATAG	MISSION AREA ANALYSIS TEST ADVISORY GROUP
MAC	MAINTENANCE ALLOCATION CHART
MACI	MILITARY ADAPTATION OF COMMERCIAL ITEMS
MACOM	MAJOR ARMY COMMAND
MADP	MATERIEL ACQUISITION DECISION PROCESS MISSION AREA DEPLOYMENT PLAN
MADS	MISSION AREA DEFICIENCY STATEMENT
MALA	MANPOWER AND LOGISTICS ANALYSIS
MAMP	MATERIEL ACQUISITION MANAGEMENT PLAN
MANPRINT	MANPOWER AND PERSONNEL INTEGRATION
MAP	MATERIEL ACQUISITION PROCESS
MARC	MANPOWER REQUIREMENTS CRITERIA
MARDIS	MODERNIZED ARMY RESEARCH AND DEVELOPMENT INFORMATION SYSTEM
MAV	MINIMUM ACCEPTABLE VALUE
MDEP	MANAGEMENT DECISION PACKAGE
MDR	MILESTONE DECISION REVIEW
MDV	MANPRINT DOMAIN VERIFICATION
MEEI	MINIMUM ESSENTIAL ELEMENTS OF INFORMATION
MEPSCAT	MILITARY ENTRANCE PHYSICAL STRENGTH CAPACITY TESTS
MFA	MATERIEL FIELDING AGREEMENT MISSION FUNCTIONAL ANALYSIS
MFP	MATERIEL FIELDING PLAN
MFT	MATERIEL FIELDING TEAM
MILSTD	MILITARY STANDARD
MJWG	MANPRINT JOINT WORKING GROUP
MLRPS	MANPOWER LONG RANGE PLANNING SYSTEM
MMH	MAINTENANCE MAN-HOURS
MMH/MA	MAINTENANCE MAN-HOURS PER MAINTENANCE ACTION
MN	MATERIEL NEED
MOA	MEMORANDUM OF AGREEMENT
MOC	MANAGEMENT OF CHANGE
MOS	MILITARY OCCUPATIONAL SPECIALTY MILITARY OCCUPATIONAL SURVEY
MOSLS	MOS LEVEL SYSTEM
MOU	MEMORANDUM OF UNDERSTANDING
MP	MISSION PROFILE
MPA	MILITARY PERSONNEL, ARMY
MPT	MANPOWER, PERSONNEL, AND TRAINING
MPTTA	MANPOWER, PERSONNEL, AND TRAINING TRADE-OFF ANALYSIS
MQS	MILITARY QUALIFICATION STANDARDS
MR	MAINTENANCE RATIO
MRA	MANPRINT RISK ASSESSMENT
MRC	MAINTENANCE REQUIREMENT CARDS
MRD	MILESTONE REVIEW DOCUMENTATION
MRF	MILESTONE REFERENCE FILE
MRIS	MODERNIZATION RESOURCE INFORMATION SYSTEM
MRSA	US ARMY MATERIEL READINESS SUPPORT ACTIVITY

MSA	MPT SENSITIVITY ANALYSIS
MSO	MATERIEL STATUS OFFICE
MSP	MISSION SUPPORT PLAN
MTBF	MEAN TIME BETWEEN FAILURES
MTBMA	MEAN TIME BETWEEN MAINTENANCE ACTIONS
MTOE	MODIFIED TABLE OF ORGANIZATION AND EQUIPMENT
MTTR	MEAN TIME TO REPAIR
MWO	MODIFICATION WORK ORDER
NCOES	NONCOMMISSIONED OFFICER EDUCATION SYSTEM
NDI	NONDEVELOPMENTAL ITEM
NET	NEW EQUIPMENT TRAINING
NETP	NEW EQUIPMENT TRAINING PLAN
NETT	NEW EQUIPMENT TRAINING TEAM
NETTSP	NEW EQUIPMENT TRAINING TEST SUPPORT PACKAGE
NMIBT	NEW MATERIEL INTRODUCTORY BRIEFING TEAM
NMS	NEW MANNING SYSTEM
NSN	NATIONAL STOCK NUMBER
NTC	NATIONAL TRAINING CENTER
NVTP	NIGHT VISION TRAINING PLAN
O&O PLAN	OPERATIONAL AND ORGANIZATIONAL PLAN
O&S	OPERATING AND SUPPORT (COSTS)
OA	ORGANIZATIONAL ASSESSMENT
OAC	OFFICER ADVANCED COURSE
OBCE	OPERATIONAL BASELINE COST ESTIMATE
OCS	OPTIMAL CLASS SIZE
ODCSOPS	OFFICE OF THE DEPUTY CHIEF OF STAFF FOR OPERATIONS AND PLANS
ODCSPER	OFFICE OF THE DEPUTY CHIEF OF STAFF FOR PERSONNEL
ODP	OFFICER DISTRIBUTION PLAN
OICTP	OUTLINE INDIVIDUAL AND COLLECTIVE TRAINING PLAN
OJT	ON-THE-JOB TRAINING
OM	OPERATIONAL MANNING
OMA	OPERATION AND MAINTENANCE, ARMY
OMF	OFFICER MASTER FILE
OMS	OPERATION MODE SUMMARY
ORSA	OPERATIONS RESEARCH SYSTEMS ANALYSIS
OSE	OTHER SUPPORT EQUIPMENT
OSHA	OCCUPATIONAL SAFETY AND HEALTH AGENCY
OSUT	ONE STATION UNIT TRAINING
OT	OPERATIONAL TEST
OT&E	OPERATIONAL TEST AND EVALUATION
OTEA	OPERATIONAL TEST AND EVALUATION AGENCY
OTP	OUTLINE TEST PLAN
OYC	OUT YEAR COSTS
PAA	PROCUREMENT APPROPRIATION, ARMY
PARR	PROGRAM ANALYSIS AND RESOURCE REVIEW
PAT	PRODUCTION ACCEPTANCE TESTING
PBD	PROGRAM BUDGET DECISION
PCO	PROCUREMENT CONTRACTING OFFICER
PCS	PROJECT COORDINATION SHEET
PDD	PROGRAM DIRECTIVE DOCUMENT

PDIP	PROGRAM DEVELOPMENT INCREMENTAL PACKAGE
Pe	EQUIPMENT PERFORMANCE
Ph	HUMAN PERFORMANCE
Ps	SYSTEM PERFORMANCE
PDM	PROGRAM DECISION MEMORANDUM
PERSACS	PERSONNEL STRUCTURE AND COMPOSITION TEAM
PERT	PROGRAM EVALUATION AND REVIEW TECHNIQUE
PHA	PRELIMINARY HAZARD ANALYSIS
PHL	PRELIMINARY HAZARDS LIST
PIB	PROGRAM INFORMATION BRIEF
PIP	PRODUCT IMPROVEMENT PROGRAM
	PRODUCT IMPROVEMENT PROPOSAL
PLL	PRESCRIBED LOAD LIST
PM	PROGRAM MANAGER/PROJECT MANAGER/PRODUCT MANAGER
PMAD	PERSONNEL MANAGEMENT AUTHORIZATION DOCUMENT
PMCS	PREVENTIVE MAINTENANCE CHECKS AND SERVICES
	PROGRAM MANAGEMENT CONTROL SYSTEM
PMD	PROGRAM MANAGEMENT DOCUMENTATION
PMP	PROGRAM MANAGEMENT PLAN
PM TRADE	PROJECT MANAGER, TRAINING DEVICES
POE	PROJECTED OPERATIONAL ENVIRONMENT
POI	PROGRAM OF INSTRUCTION
POM	PROGRAM OBJECTIVE MEMORANDUM
PPBS	PLANNING, PROGRAMMING, AND BUDGETING SYSTEM
PPBES	PLANNING, PROGRAMMING, BUDGETING, AND EXECUTION SYSTEM
PQA	PRELIMINARY QUANTITATIVE ANALYSIS
PQS	POSITION QUALIFICATION STANDARDS
PQT	PRODUCTION QUALIFICATION TEST
PRIMIR	PRODUCT IMPROVEMENT MANAGEMENT INFORMATION REPORT
PRR	PRODUCTION READINESS REVIEW
PRS	PERFORMANCE REQUIREMENTS SUMMARY
PTD	PROVISIONING TECHNICAL DOCUMENTATION
PSE	PROGRAMMED SYSTEM EVOLUTION
PTEA	PRELIMINARY TRAINING EFFECTIVENESS ANALYSIS
PULHES	PHYSICAL CAPACITY OR STAMINA: U-UPPER EXTREMITIES; L-LOWER EXTREMITIES; H-HEARING AND EARS; E-EYES; AND S-PSYCHIATRIC
PV	PERFORMANCE VALUES/PERTURBATION VALUE
	PRODUCTION VALIDATION
PWS	PERFORMANCE WORK STATEMENT
P3I	PRE-PLANNED PRODUCT IMPROVEMENT
QCR	QUALITATIVE CONSTRUCTION REQUIREMENTS
QQPRI	QUALITATIVE AND QUANTITATIVE PERSONNEL REQUIREMENTS INFORMATION
QRC	QUICK REACTION CAPABILITY
QRR	QUALITATIVE RESEARCH REQUIREMENT
QUASI POI	'ALMOST' PROGRAM OF INSTRUCTION
R&D	RESEARCH AND DEVELOPMENT
R&M	RELIABILITY AND DEVELOPMENT
RAM	RELIABILITY, AVAILABILITY, AND MAINTAINABILITY
RAM-D	RELIABILITY, AVAILABILITY, AND MAINTAINABILITY-

	DURABILITY
RC	RESERVE COMPONENT
RDA	RESEARCH, DEVELOPMENT, AND ACQUISITION
RDTE	RESEARCH, DEVELOPMENT, TEST, AND EVALUATION
RECAP	REVIEW AND COMMAND ASSESSMENT OF PROJECTS
RFP	REQUEST FOR PROPOSAL
RFQ	REQUEST FOR QUOTATION
RMR	RESOURCE MANAGEMENT REVIEW
ROC	REQUIRED OPERATIONAL CAPABILITY
ROI	RETURN ON INVESTMENT
RPV	REMOTELY PILOTED VEHICLE
RPSTL	REPAIR PARTS AND SPECIAL TOOLS LIST
S&I	STANDARDIZATION AND INTEROPERABILITY
SAC	SENATE APPROPRIATIONS COMMITTEE
SACS	STRUCTURE AND COMPOSITION SYSTEM
SADM	SYSTEM ACQUISITION DECISION MEMORANDUM
SAF	SUBJECT TO AVAILABILITY OF FUNDS
SAR	SELECTED ACQUISITION REPORT
	SAFETY ASSESSMENT REPORT
SAT	SYSTEMS APPROACH TO TRAINING
SCP	SYSTEM CONCEPT PAPER
SDC	SAMPLE DATA COLLECTION
SECDEF	SECRETARY OF DEFENSE
SLAC	SUPPORT LIST ALLOWANCE CARD
SMA	SUBJECT MATTER ASSESSMENT
SME	SUBJECT MATTER EXPERT
SMMP	SYSTEM MANPRINT MANAGEMENT PLAN
SNCIE	STATEMENT OF NEED CLOTHING AND INDIVIDUAL EQUIPMENT
SOQAS	STATEMENT OF QUALITY AND SUPPORT
SOW	STATEMENT OF WORK
SPAS	SKILL PERFORMANCE AIDS
SPE	SYSTEM PERFORMANCE EVALUATION
SPM	SECURITY PROGRAM MANAGER
SQI	SKILL QUALIFICATION IDENTIFIER
SQT	SKILL QUALIFICATION TEST
SSA	SOURCE SELECTION AUTHORITY
SSG	STAFF STUDY GROUP
SSI	SPECIALTY SKILL IDENTIFIER
SSP	SYSTEM SUPPORT PACKAGE
STAR	SYSTEM THREAT ASSESSMENT REPORT
STF	SPECIAL TASK FORCE
STO	SCIENCE AND TECHNOLOGY OBJECTIVES
TAA	TOTAL ARMY ANALYSIS
TAADS	THE ARMY AUTHORIZATION
TAD	TARGET AUDIENCE DESCRIPTION
TADS	TARGET ACQUISITION DESIGNATION SYSTEM
TAG	TECHNICAL ADVISORY GROUP
TAMA	THREAT TO ARMY MISSION AREAS
TAMMS	THE ARMY MAINTENANCE MANAGEMENT SYSTEM
TAMS	TRAINING AMMUNITION MANAGEMENT SYSTEM
TAP	THE ARMY PLAN

TBOIP	TENTATIVE BASIS OF ISSUE PLAN
TBOIPFD	TENTATIVE BASIS OF ISSUE PLAN FEEDER DATA
TC	TYPE CLASSIFICATION
TCA	TASK COMPARABILITY ANALYSIS
TCG	THREAT COORDINATING GROUP
TD	TRAINING DEVELOPER
	TRAINING DEVICE
TDA	TABLE OF DISTRIBUTION AND ALLOWANCES
TDP	TECHNICAL DATA PACKAGE
	TECHNICAL DESIGN PLAN
TDR	TRAINING DEVICE REQUIREMENT
TE	TECHNICAL EXHIBITS
	TEST EQUIPMENT
TEA	TRAINING EFFECTIVENESS ANALYSIS
TEMP	TEST AND EVALUATION MASTER PLAN
TFR	TROUBLE FAILURE REPORTS
TIWG	TEST INTEGRATION WORKING GROUP
TM	TECHNICAL MANUAL
TMDE	TEST, MEASUREMENT, AND DIAGNOSTIC EQUIPMENT
TOA	TRADE-OFF ANALYSIS
TOD	TRADE-OFF DETERMINATION
TOE	TABLE OF ORGANIZATION AND EQUIPMENT
TPCA	TASK PERFORMANCE CAPABILITY ANALYSIS
TPRA	TASK PERFORMANCE REQUIREMENTS ANALYSIS
TQQPRI	TENTATIVE QUALITATIVE AND QUANTITATIVE PERSONNEL REQUIREMENTS INFORMATION
TRAC	TRADOC ANALYSIS COMMAND
TRACE	TOTAL RISK ASSESSMENT COST ESTIMATING
TRADOC	US ARMY TRAINING AND DOCTRINE COMMAND
TRAS	TRAINING REQUIREMENTS ANALYSIS SYSTEM
TRASSO	TRADOC SYSTEM STAFF OFFICER
TSARC	TEST SCHEDULE AND REVIEW COMMITTEE
TSG	THE SURGEON GENERAL
TSM	TRADOC SYSTEM MANAGER
TSP	TEST SUPPORT PACKAGE
	THREAT SUPPORT PLAN
TSWG	TEST SUPPORT WORK GROUP
TT	TECHNICAL TESTING
TTHS	TRAINEES, TRANSIENTS, HOLDEES, AND STUDENTS
UCF	UNIFORM CONTRACT FORMAT
UIC	UNIT IDENTIFICATION CODE
URS	UNIT REFERENCE SHEET
USAICS	U.S. ARMY INTELLIGENCE CENTER AND SCHOOL
USAPIC	U.S. ARMY PERSONNEL INTEGRATION COMMAND
UT	USER TESTING
WBS	WORD BREAKDOWN STRUCTURE
WPE	WORD PROCESSING EQUIPMENT
WSAP	WEAPON SYSTEM ACQUISITION PROCESS
WSMAT	WEAPON SYSTEM MANAGEMENT TEAM
WSSM	WEAPON SYSTEM STAFF MANAGER
WSSO	WEAPON SYSTEM SUPPORT OFFICER
WUC	WORK UNIT CODE

WS WORK STATEMENT

APPENDIX D

GLOSSARY

Army Occupational Survey Program. With the cooperation of service schools, the AOSP does research on MOS. Using soldier tasks as the basic units of analysis, data are collected on such variables as percent performing, task learning difficulty, and relative time spent. After the survey data have been analyzed, a report on the MOS is prepared.

Combat Developer. The command or agency responsible for concepts, doctrine, organization (excluding Army wholesale logistics), and system objectives and requirements. The CD at the user proponent school is designated as the lead combat developer and will coordinate the overall effort with the CDs at the other service schools and TDs at the user proponent service school.

Cut-off Score. A preestablished value that identifies potential high drivers.

ECA Task Score. The product of values assigned to each of the task criteria identified during an ECA application. ECA task score equals AXBXCXDXEXF. It is calculated for each task associated with operation, maintenance, and repair of the predecessor or reference system.

Enlisted Master File. A file that contains personnel record data on every enlisted individual. It provides ASVAB scores and associated data for every soldier in a given MOS.

FOOTPRINT. An automated Manpower, Personnel, and Training (MPT) tool, becoming fully operational as a relational data base on-line system effective 1 April 91. The compiled data, derived from existing data bases, is stored on the HQ TRADOC and HQ DA Decision Support System (DSS) and is projected as a series of standard MPT data screens by Military Occupational Specialty (MOS).

High Driver. A task identified through analysis of task criteria as being costly in MPT resources. The primary objective of ECA is to aid CDs in identifying high drivers requiring a design change so that these tasks can be reduced in number or completely eliminated from new system design. Information from tasks derived from predecessor or reference systems are the key to determining the impact these tasks have on the Army MPT resources.

Learning Analysis. A process of determining knowledge, skills, and abilities required to perform each step of a task. This analysis is important for determining MPT deficiencies.

Logistic Support Analysis Report. File of logistic support

information in standardized format on acquisition programs for specific new or modified systems and equipment. All tasks, required to maintain a system, appear on LSAR worksheets along with the hours needed per task and people needed per task.

MANPRINT. Refers to the comprehensive technical effort to assure total system effectiveness by continuous integration into materiel development and acquisition of all relevant information concerning the following: manpower, personnel, training, human factors engineering, system safety, and health hazards. The philosophy of the MANPRINT program is to have the Army and industry take actions to answer the question: "Can this soldier, with this training, perform these tasks, to these standards, under these conditions?"

Manpower. The personnel strength (military and civilian) as expressed in terms of the number of men and women available to the Army.

Personnel. Military and civilian persons of the skill level and grades required to operate and support a system in peacetime and war.

Predecessor System. A system or item of equipment that currently exists which has been targeted for replacement or improvement.

Qualitative and Quantitative Personnel Requirements Information. The QQPRI is a compilation of organizational, doctrinal, training, duty position, and personnel information. It is used to determine the need to establish or revise an MOS, SSI, and civilian occupational series. Additionally, QQPRI data is required to prepare plans to provide training and personnel needed to operate, maintain, and support the new or improved materiel system or item of equipment.

Quick Fix. The use of ECA findings to make MPT changes as rapidly as possible to ensure that new system maximum effectiveness is achieved. It is an interim solution until appropriate design changes can be made on a new or improved materiel system.

Request for Proposal. Request for the manufacturer to submit a proposal supported by cost breakdown. It provides a description of items to be procured. It may include specifications, quantities, time and place of delivery, method of shipment, packaging and instructional manual requirements, materiel to be furnished, and data requirements, both support and administrative.

Reference System. A system or components of an existing system that can be found in current inventories to meet or closely approximate mission requirements of a new, proposed system or component.

Sample Data Collection. A method for obtaining information on the performance and maintainability of an item of equipment. Data are obtained directly from observations made in the field. An effort is made to see that the sample from which the feedback is obtained is representative of the total population.

Subject Matter Expert. Normally a noncommissioned officer who has extensive hands on experience with the studied equipment, recent unit experience, and a background as a trainer or training developer.

System MANPRINT Management Plan. The SMMP serves as a planning and management guide and an audit trail to identify tasks, analyses, trade-offs, and decisions that must be made to address MANPRINT issues during the materiel development and acquisition process.

Task. The simplest level of behavior that describes the performance of a meaningful job function. Tasks are actions that are (1) observable, (2) measurable (in terms of performance), (3) time-ratable (have a definite beginning and end), (4) of relatively short duration (minutes or hours versus days or weeks), (5) and independent. Individual soldier tasks are crucial to the determination of MPT impacts on the design of the new system. They become a common language for combat developers, system designers, training developers, and training evaluators.

Task Analysis. The process of breaking down a task into its individual steps; identifying the tools used; and defining the conditions and standards under which the steps are performed.

Task Criteria. Categories of information about tasks that are either readily available or easily made available. Specific examples are data on percent performing, decay rate, frequency of performance, task learning difficulty, performance difficulty, and time to train.

Training. The instruction/teaching of job skills and knowledge to prepare individuals for job performance.

Training Developer. The command or agency responsible for development and conduct of training that will provide the skills necessary to operate and logistically support materiel systems.

USAREC Accessions. The number of soldiers entering the Army that are scheduled to train in specific MOS. Data for specific MOS are available by distribution of mental category, average AFQT score, aptitude area scores, gender, and educational level.